## REMARKS

Claims 1-27 are now presented for examination. Claims 1-5, 12-16 and 23 have been amended to define still more clearly what Applicant regards as his invention, in terms which distinguish over the art of record. Claims 25-27 have been added to assure Applicant of the full measure of protection to which he deems himself entitled. Claims 1, 8, 12, 19, 23 and 24-27 are the only independent claims.

In view of the Examiner's comments as to the terms "phoneme, "diphones" and "triphones" the claims have been amended to replace the term "phoneme" where appropriate by the term "polyphone" which refers to a plurality of phonemes such as a "triphone" shown in the drawings and disclosed in the specification.

Claims 1-24 have been rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,659,664 (Kaja) in view of U.S. Patent No. 5,913,193 (Huang et al.). With regard to the claims as currently amended, this rejection is respectfully traversed.

Independent Claims 1, 12 and 23 as currently amended are directed to a speech synthesis arrangement having a database that manages phonemic piece data. According to the arrangement, a first polyphone is generated in consideration of a phonemic context fro a phoneme as a search target. The database is searched for phonemic piece data corresponding to the first polyphone. A second polyphone is generated by changing the phonemic context based on the search result and the database is re-searched for phonemic piece data corresponding to the second polyphone. The search result obtained in the search or the re-search is registered in a table in correspondence with the first or second polyphone.

New independent Claims 25-27 are directed to a speech synthesis apparatus arrangement having a database that manages phonemic piece data. According to the arrangement, a polyphone is generated in consideration of a phonemic context for a phoneme as a search target. The database is searched for a phonemic piece data corresponding to the polyphone. The database is re-searched for phonemic piece data corresponding to the phoneme. The search result obtained by the search or re-search is registered in a table in correspondence with the polyphone.

The features of new Claims 25-27 are disclosed at least from line 26 of page 10 to line 12 of page 12 in the specification. No new matter is believed to have been added.

In Applicant's view, Kaja discloses a speech synthesis method which provides an automatic mechanism for simulating human speech and solves the problem of coarticulation using an interpolation mechanism. According to the method, Control parameters that control a speech synthesis device are stored in a matrix or a sequence list for each polyphone. The behavior of the respective parameter with time is defined around each phoneme boundary and polyphones are joined by forming a weighted mean value of the curves which are defined by their two associated matrices/sequences list.

In Applicant's opinion, Huang et al. discloses a concatenative speech synthesis system and method which produces a more natural sounding speech. The system provides for multiple instances of each acoustic unit which can be used to generate a speech waveform representing an linguistic expression. The multiple instances are formed during an analysis or training phase of the synthesis process and are limited to a robust representation of the highest probability instances. The provision of multiple instances enables the synthesizer to select the instance which closely resembles the desired instance thereby eliminating the need to alter the stored instance to

match the desired instance. This minimizes the spectral distortion between the boundaries of adjacent instances thereby producing more natural sounding speech.

According to the invention of Claims 1, 12 and 23, after searching a database for phonemic piece data corresponding to a polyphone generated in consideration of phonemic context for a phoneme as a search target, a second polyphone is generated by changing the phonemic context based on the search result and the database is re-searched for phonemic piece data corresponding to the second polyphone. The search result obtained in the search or in the re-search is registered in a table on correspondence with the first or second polyphone. In Claims 25-27, re-search of a database is performed for phonemic piece data corresponding to a generated polyphone and re-search of the database is performed for phonemic piece data corresponding to the phoneme. The search result of the search or the re-search is registered in a table in correspondence with the polyphone.

Kaja may disclose using numeric methods in an iterative process which, by stages, ensures that a synthetic phrase more and more resembles a natural phrase and extracting control parameters from the synthetic phrase (see lines 35-43 of column 3). The Kaja disclosure, however, fails to teach or suggest a re-search arrangement of generating a second polyphone by changing the phonemic context on the basis of the search result obtained in a previous search for phonemic piece data based on a first polyphone, and re-searching the database for phonemic piece data corresponding to the second polyphone as in the present invention. Further, Kaja fails to teach or suggest registering the search result obtained in the search or the re-search in a table in correspondence with the first or second polyphone as in the present invention.

Huang et al. has been cited as teaching storage relying on a table of senones (i.e., cluster of similar markov states across different phonetic models) stored in HMM storage 24. The senones of Huang et al. are used by an iterative algorithm that alternates between segmenting input speech given a set of Hidden Markov Model parameters and re-estimating the HMM parameters given the speech segmentation. The algorithm is stopped when convergence is reached. It is not seen that Huang et al.'s HMM senone storage and algorithm using such storage to provide convergence in any manner suggests the features of searching a database for phonemic piece data corresponding to a first polyphone in consideration of phonemic context for a phoneme, then generating a second polyphone by changing the phonemic context based on the search and researching the database for phonemic piece data corresponding to the second polyphone. Further, the storage of senones for use in re-estimating an HMM model in Huang et al. is not seen as suggesting in any manner the feature of registering a search result obtained from a search based on a first polyphone or a re-search based on a second polyphone as in the present invention.

With regard to the cited combination, Kaja only teaches using numeric methods in an iterative process which, by stages, ensures that a synthetic phrase more and more resembles a natural phrase and extracts control parameters from the synthetic phrase and Huang et al. is limited to teaching senone storage used to provide convergence of an algorithm using an HMM model. It is not seen that the addition of Huang et al.'s senone storage to Kaja's iterative numereic process to make a synthetic phrase resemble a natural phrase in any manner suggests the feature of searching a database for phonemic piece data corresponding to a polyphone generated in consideration of phonemic context for a phoneme as a search target, generating a second polyphone by changing the phonemic context based on the search result and re-searching the

database for phonemic piece data corresponding to the second polyphone combined with the feature of registering the search result obtained in the search or in the re-search a table on correspondence with the first or second polyphone. It is therefore believed that Claims 1, 12, 23 and similar Claims 25-27 are completely distinguished from any combination of Kaja and Huang et al. and are allowable.

Pending independent Claims 8, 19 and 24 are directed to a speech synthesis arrangement that performs speech synthesis by using phonemic piece data managed by a database. According to the arrangement, a table for managing position information indicating the position of phonemic piece data in the database is stored in correspondence with a phoneme obtained in consideration of a phonemic context made to correspond to the phonemic piece data. Phonemic context information of the phoneme as a synthesis target of fundamental frequencies corresponding thereto are acquired and an average of the acquired fundamental frequencies is calculated. A phoneme group corresponding to the phonemic context information is searched in the table. Position information of the phonemic piece data corresponding to a predetermined phoneme of the searched phoneme group is acquired from the table on the basis of the calculated average fundamental frequencies. The phonemic piece data indicated by the position information acquired from the database is acquired and the prosody of the acquired phonemic piece data is changed.

Huang et al. may teach that a stream of phonemes obtained from converting a word string into a stream of phonemes which are transmitted to a prosody engine along with word tags. The prosody for each phoneme in Huang et al. is determined on a sentence basis but can be words or multiple sentences. In contrast to Huang et al., it is a feature of Claims 8, 19 and 24 that phonemic context information of the phoneme as a synthesis target of fundamental frequencies

corresponding thereto are acquired and an average of the acquired fundamental frequencies is calculated. A phoneme group corresponding to the phonemic context information is searched in the table and position information of the phonemic piece data corresponding to a predetermined phoneme of the searched phoneme group is acquired from the table on the basis of the calculated average fundamental frequencies. The phonemic piece data indicated by the position information acquired from the database is acquired and the prosody of the acquired phonemic piece data is changed. It is not seen that the prosody determination of Huang et al. using a stream of phonemes with tags on a sentence basis in any manner teaches or suggests changing the prosody of acquired phonemic piece data based on a search of a table for managing position information indicating the position of phonemic piece data as in Claims 8, 19 and 24. It is also not seen that Kaja teaches the combination of features of Claims 8, 19 and 24. Accordingly, it is believed that pending Claims 8, 19 and 24 are completely distinguished from any combination of Kaja and Huang et al. and are allowable.

A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record. Applicants submit that the amendments to independent Claims 1, 12 and 23 clarify Applicant's invention and serve to reduce any issues for appeal.

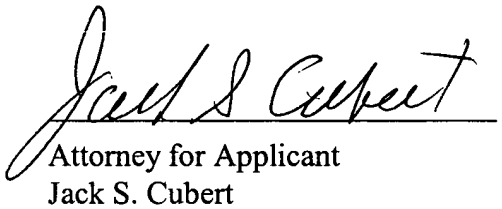
The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention,

however, the individual consideration or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable consideration and reconsideration and early passage to issue of the present application. The Examiner is respectfully requested to enter this Amendment

Applicant's attorney, Douglas Pinsky, may be reached in Washington, D.C. by telephone at (202) 530-1010. All correspondence should continue to be directed to the below-listed address.

Respectfully submitted,



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